

## DRAFT

# FINDING OF NO SIGNIFICANT IMPACT (FONSI) ENVIRONMENTAL ASSESSMENT FOR THE ORBITAL/SUB-ORBITAL PROGRAM

**Agency:** United States Air Force (USAF)

**Background:** Pursuant to the provisions of the National Environmental Policy Act (NEPA) of 1969, Executive Order 12114, Council on Environmental Quality (CEQ) Regulations [40 Code of Federal Regulations (CFR) Parts 1500-1508], and 32 CFR Part 989, the USAF has conducted an assessment of the potential environmental consequences of implementing the proposed Orbital/Sub-Orbital Program (OSP). The assessment focused on those activities that have the potential to affect the human and natural environments.

Advances in satellite manufacturing technology have allowed the size and mass of satellites to diminish without loss of capability. As a result, the desire for reliable, low-cost spacelift systems, particularly for small and micro Research, Development, Test and Evaluation (RDT&E) satellites, has increased in recent years. However, finding shared space on some commercial or larger launch vehicles for specific orbits is not always possible or cost effective.

The Department of Defense (DOD) has a long history of using small satellites to support the testing of new components prior to incorporation into large-scale operational satellite programs. In addition, a number of small and micro RDT&E satellite programs within other US Government agencies could be supported. Low-cost target vehicles are also needed to provide realistic threat simulations for the testing of long-range ballistic missile defense systems by the DOD. Other Government missions may potentially require short-duration, sub-orbital flights for experimental purposes.

Under the OSP, the USAF is developing a new family of launch vehicles using surplus Minuteman (MM) II and Peacekeeper (PK) Inter-Continental Ballistic Missile (ICBM) rocket motors (along with commercial upper stages) to support both orbital launches of small and micro satellites, and sub-orbital-trajectory missions. The OSP will provide low-cost, reliable launch services for Government-sponsored payloads using flight-proven hardware and software currently available, with a demonstrated success record.

Consistent with the National Space Transportation Policy of 1994, OSP launches will support only US Government payloads, or those missions sponsored through US Government agencies. In addition, the US Secretary of Defense must approve each mission to ensure that program launches do not compete with, and are not detrimental to, the commercial space launch industry.

To avoid the cost of building and maintaining new launch complexes, the OSP will maximize the use of existing facilities for launch support. To satisfy various orbital inclination requirements, launch schedules, and other mission needs, spaceport locations on both East and West Coasts of the United States will be utilized.

The Environmental Assessment (EA) considers all potential impacts of the Proposed Action and the No Action Alternative. This Finding of No Significant Impact (FONSI) summarizes the results of the evaluations of the proposed activities associated with the proposed OSP.

**Proposed Action and No Action Alternative:** The EA documents the environmental analysis of implementing the OSP, which will provide enhanced capability and flexibility to the development of

## DRAFT

space launch and target vehicles using excess MM and PK rocket motors (including use of commercial upper stages and various subsystems) to meet a wide variety of mission requirements. It is expected that all launches will be conducted from an existing Government range and/or commercial spaceport located at Vandenberg Air Force Base (AFB), California; Kodiak Launch Complex, Alaska; Cape Canaveral Air Force Station (AFS), Florida; and Wallops Flight Facility, Virginia.

Because only a few specific missions have been identified to date for the OSP, the EA takes a programmatic approach in assuming a maximum of five or six launches per year, over a 10-year period, beginning in 2005. All five or six annual launches could occur from just one of the four ranges, or be spread across the different ranges. Vandenberg AFB and Kodiak Launch Complex will be capable of handling up to six launches per year, while Cape Canaveral AFS and Wallops Flight Facility can support up to five launches per year. For each range, applicable site modifications and construction activities (including some demolitions), rocket motor transportation, pre-flight preparations, flight activities, and post-launch operations are addressed. At each launch site, existing facilities will be used, with limited facility modifications required in most cases. Both preferred and alternate launch support facilities (if available) are considered.

In terms of orbital missions, a wide variety of small- and micro-satellites could be launched from any of the launch sites into Low Earth Orbit (LEO). Specific orbital missions identified to date for the OSP, and other representative spacecraft, are also analyzed in the EA.

Per the CEQ and USAF regulations, this EA also analyzes the No Action Alternative, which serves as the baseline from which to compare the Proposed Action. Under the No Action Alternative, the OSP would not be implemented. However, some existing missions involving the use of excess ICBM assets for target launches out of Vandenberg AFB and Kodiak Launch Complex would still be conducted, in accordance with prior NEPA analyses. In addition, use of ICBM assets for orbital launch purposes would still be considered on a case-by-case basis, following appropriate NEPA reviews.

**Environmental Effects:** For each of the four ranges proposed for conducting OSP launches, potential environmental effects were assessed for the following environmental resources: air quality, noise, biological resources, cultural resources (Vandenberg AFB only), health and safety, and hazardous materials and waste management. Other resource areas—including hydrology and groundwater, utilities, land use, transportation, socioeconomics, environmental justice, soil resources, visual and aesthetic resources, and cultural resources (at all other sites)—were not analyzed further because no significant impacts to these resources are anticipated as a result of implementing the Proposed Action. Potential effects on the environment from implementation of the Proposed Action are described in the following paragraphs.

- ***Air Quality.*** Because limited modifications are required at most of the ranges and facilities, construction-related impacts on air quality will be minimal. At Vandenberg AFB, proposed demolition and construction activities at some of the launch sites will generate fugitive dust from structure removal, ground disturbance, and related operations. However, no significant amounts of emissions are anticipated, and standard dust reduction measures will be implemented.

During OSP launches at each of the four ranges, rocket motor exhaust emissions will be released into the lower atmosphere. Because the launches are infrequent, short-term events, emissions products will be rapidly diluted and dispersed by prevailing winds. No violation of air quality standards or health-based standards for non-criteria pollutants is anticipated. Also, the USAF's review of the General Conformity Rule resulted in a finding of presumed conformity with the State Implementation Plan for Vandenberg AFB. No Conformity Determination is required for the other three ranges. Overall, no significant impacts to air quality are anticipated to occur.

## DRAFT

- **Noise.** Noise exposures from proposed demolition, modification, and construction activities at Vandenberg AFB are expected to be minimal, short term, and generally affecting only the areas immediately around each facility. If blasting of concrete and steel structures becomes necessary during the demolition work, much higher impulse noise levels will also be generated, but such occurrences will be rare. Any construction-related noise at the other three ranges will be minimal.

OSP launches at each of the four ranges will generate an A-weighted Sound Exposure Level (ASEL) exceeding 120 decibels (dB) in the immediate vicinity of each launch site, to about 85 dB ASEL nearly 8 miles (13 kilometers) away. Outside range boundaries, local communities could experience launch noise levels up to 100 dB ASEL at some locations. While these noise exposure levels can be characterized as very loud, they will occur infrequently, are very short in duration (about 20 seconds of intense sound per launch), and, for public areas, will be well within Occupational Safety and Health Administration standards. As a result, no significant impacts to the noise environment on and around each range are expected.

Sonic booms generated during the launch vehicle's ascent are not expected to affect mainland coastal land areas at any range. However, launches from the Space Systems International (SSI) Commercial Launch Facility (CLF) or from other south Vandenberg AFB space launch complexes (SLC) could generate sonic booms over the northern Channel Islands, depending on the launch trajectory used. Resulting overpressures from SSI CLF launches could reach up to 1 pound per square foot (psf) on the islands. For launches from the SLC-4 sites, overpressures will be higher, estimated to be between 1 and 7 psf. The sonic booms will typically be audible for only a few milliseconds, and launches over the islands are expected to occur infrequently.

- **Biological Resources.** Because limited modifications are required at most of the ranges and facilities, construction-related impacts on biological resources will be minimal. At Vandenberg AFB, where more extensive modifications are to occur, demolition and construction-related activities will generate short periods of relatively continuous noise. In rare instances, blasting of existing structures may occur, producing very brief but high-impulse noises. Noise exposures, however, will be short-term and localized. Vegetation overgrowth around some unused launch sites at the base will require clearing, and some grading and excavation will occur, mostly in pre-disturbed areas. However, limited areas will be disturbed, and vegetated areas will be surveyed for protected and other sensitive species prior to project implementation. Some of the buildings and structures proposed for demolition and/or modification are currently used as nesting and roosting sites for various bird species, including some protected under the Migratory Bird Treaty Act. A few bat species have also been found to roost in some of the buildings. To avoid impacts to these species, surveys will be conducted several months prior to project implementation, before the start of the nesting season. Methods to discourage roosting and the initiation of nests will be implemented prior to demolition and facility modifications.

Exposure to short-term noise from launches, from helicopter overflights at some of the ranges, and from sonic booms over the northern Channel Islands of California (for Vandenberg AFB only) could cause startle effects in protected bird species, in pinnipeds (for the West Coast sites only), and in other wildlife. However, on the basis of prior monitoring studies conducted by biologists at the four ranges, it has been determined that rocket launch activities have a negligible, short-term impact on marine mammals, most sea and shore birds, and other protected species.

The exception in this case has been the Federally endangered California least tern, which nests and forages along the beaches and coastal dunes at Vandenberg AFB. During some prior Delta II launches at the base, a few pairs of least terns abandoned their nests. However, OSP launches will

## DRAFT

differ from the Delta II launches in that (1) the OSP launch sites are located much further away from least tern nesting habitat, (2) there will be no OSP launch vehicle overflights of the main least tern colony, (3) the proposed OSP launch vehicles will generate slightly lower noise levels and for a shorter duration, and (4) no more than two OSP launches per year will occur from those launch sites closest to nesting areas. To minimize the potential for impacts on least terns at Vandenberg AFB, the OSP will avoid night and low-light launches, to the extent possible, from the closest launch sites.

Launch emissions have the potential to acidify nearby streams, marshes, and other wetland areas at all four of the ranges. However, surface water monitoring following launches has not shown acidification to occur. In addition, acid-neutralizing minerals in the soil and/or the constant deposition of ocean salt spray will reduce the potential for acidification of surface waters. Some temporary distress to vegetation near launch sites from launch emissions can be expected, but no long-term adverse effects will occur.

The probability for an aborted launch to occur is extremely low. If an early abort were to occur, actions will immediately be taken for the recovery and cleanup of unburned liquid or solid propellants, and any other hazardous materials that had fallen on beaches or in shallow waters. Any propellants remaining in offshore waters will be subject to constant wave action and currents. Thus, water circulation will, in particular, help to prevent localized build-up of perchlorate concentrations from solid propellants, which has proven to be a slow process. As a result, no significant impacts on biological resources are expected to occur.

Through coordination and consultations with the US Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration (NOAA) Fisheries Service, each of the four ranges has implemented various plans and measures to limit the extent and frequency of potential impacts from rocket launches, and in some cases helicopter overflights, on protected and sensitive species. In addition, monitoring of certain species is conducted on a regular basis to ensure that no long-term impacts occur.

As a result, no significant impacts on biological resources are anticipated, and no long-term adverse effects on threatened and endangered species or critical habitats are expected to occur.

- ***Cultural Resources.*** Of the four ranges evaluated, only Vandenberg AFB has the potential for impacts to cultural resources. On base, several known archaeological sites are in proximity to some of the facilities proposed for demolition, modification, and construction. However, these activities will be tailored to ensure archaeological resources are avoided. Should ground disturbance activities occur near resource sites, precautionary measures (e.g., boundary testing, on-site monitoring, and fencing around resource sites) will be implemented. Base personnel and contractors will also be informed of the sensitivity of such sites. To reduce the potential for impacts, excavation and trenching operations will be limited to previously disturbed areas as much as possible.

Four facilities proposed for OSP use have been determined to be eligible for listing on the National Register of Historic Places for their Cold War, ICBM Program historic context. Modifications are proposed for only one of the buildings; however, a Historic American Engineering Record of the building has already been completed. In addition, the types of activities proposed to occur in these buildings will be similar to that of the earlier MM and PK ICBM support programs.

No impacts to archaeological sites or historic buildings are expected from nominal flight activities. However, falling debris from a flight termination or other launch anomaly could strike surface or subsurface archaeological deposits, or other cultural resources. With the potential for fires to occur, firefighting activities can also damage subsurface historic and prehistoric archaeological sites. In the

## DRAFT

unlikely event that a mishap occurs, post-mishap recommendations will include post-event surveying, mapping, photography, and site recordation to determine and record the extent of the damage. These efforts will be coordinated with applicable range representatives and the California State Historic Preservation Officer.

As a result, no significant impacts to cultural resources at Vandenberg AFB are expected.

- ***Health and Safety.*** At the four ranges, all OSP activities will be accomplished in accordance with applicable Federal, state, and local health and safety standards, as well as all appropriate DOD and Agency-specific regulations. Regarding rocket motor transportation over public roads, accident rates for ongoing operations have historically been very low. To conduct OSP launches at any of the ranges, range safety officials will evacuate the launch hazard area and issue Notices to Airmen, as well as to Mariners, and the hazard areas will be determined clear of both aircraft and surface vessels before proceeding with the launch. For debris generated during each OSP launch (from liftoff through to orbit insertion), expected casualty risks for individuals on the ground will be no greater than 1 in 1,000,000, in accordance with range safety standards. By adhering to established safety standards and procedures, the level of risk to range personnel, contractors, and the general public will be minimal at all of the locations affected. Thus, no significant impacts to either occupational or public health and safety are expected to occur.
- ***Hazardous Materials and Waste Management.*** At Vandenberg AFB and Cape Canaveral AFS, some of the proposed building modifications, and related demolitions, might require surveys for asbestos, lead-based paint, and PCBs if such information is not already available. Any removal of hazardous materials from the buildings and facilities will require containerizing and proper disposal at permitted facilities.

At Vandenberg AFB, the cumulative generation of solid waste from OSP-related demolition and construction activities, in addition to other planned demolitions, has the potential to exceed the permitted disposal tonnage on base. Coordination of implementation schedules for these projects, and appropriate tracking of disposal tonnages, will be needed to ensure that permitted disposal amounts at the Base Landfill are not exceeded.

At all four ranges, hazardous materials will be managed in accordance with well-established policies and procedures. Hazardous wastes will be properly disposed of, in accordance with all applicable Federal, state, local, and Agency-specific regulations. Each range has in place a plan that provides guidelines and instructions to prevent and control accidental spills of hazardous materials. Appropriate permits are also in place and workers are trained. Hazardous material and waste-handling capacities will not be exceeded, and management programs will not have to change.

Consequently, no adverse impacts from the management of hazardous materials and waste for the OSP are expected.

Because of the potential global effects of launching rockets over the oceans and through the Earth's atmosphere to orbit, the EA also considered the environmental effects on the global environment in accordance with the requirements of Executive Order 12114. Specifically, potential impacts on the upper atmosphere and stratospheric ozone layer, on marine life in the Broad Ocean Area, and on safety-related issues associated with orbital and re-entry debris were considered. These are described in the following paragraphs:

- ***Upper Atmosphere/Stratospheric Ozone Layer.*** The exhaust emissions released from OSP launch vehicles into the upper atmosphere will add to the overall global loading of chlorine and other gases

## DRAFT

that contribute to long-term ozone depletion. However, when compared to the amount of emissions released on a global scale, the flight tests will not be statistically significant in contributing to cumulative impacts on the stratospheric ozone layer. Emissions will be rapidly dispersed during the launch vehicle's ascent. Thus, no mitigating actions will be necessary.

- ***Broad Ocean Area/Marine Life.*** Sonic boom overpressures from launch vehicles could be audible to protected marine species and sea turtles underwater. An underwater acoustic pulse of 178 dB [referenced to 1 micro Pascal ( $\mu\text{Pa}$ )] is considered the lower limit for inducing behavioral reactions in marine mammals (cetaceans), while 218 dB (referenced to 1  $\mu\text{Pa}$ ) is considered the lower limit for inducing temporary threshold shift (TTS) in marine mammals and sea turtles. However, the resulting underwater pressures from sonic booms generated by OSP launch vehicles and sub-orbital target payloads will fall below the lower limits for inducing behavioral reactions, and well below the TTS threshold.

For marine animals, the potential exists for direct contact or exposure to underwater shock/sound waves from the splashdown of spent rocket motors and sub-orbital target payloads. However, the likelihood for protected marine mammals or sea turtles to be located in close proximity to the impact points is extremely low, as OSP launches will occur only a few times per year, and impacts from each flight likely will not occur at the same locations.

Though residual amounts of battery electrolytes, hydraulic fluid, and propellant materials in the spent rocket motors could lead to the contamination of seawater, the risk of marine life coming in contact with, or ingesting, toxic levels of solutions is unlikely, considering the rapid dilution of any contaminants and the rapid sinking of any contaminated components to the ocean floor.

In summary, OSP launches will have no discernible effect on the ocean's overall physical and chemical properties. There will be minimal risk of launch vehicle components hitting or otherwise harassing marine mammals and sea turtles within the open ocean. Moreover, such activities will have no discernible effect on the biological diversity of either the pelagic or benthic marine environment. Consequently, no threatened and endangered marine mammals or sea turtles are likely to be adversely affected, nor will other biological resources within the open ocean be significantly impacted.

- ***Orbital and Re-entry Debris.*** The probability that OSP mission spacecraft in LEO will collide with medium- and large-size debris over their functional lifetimes is considered low. Moreover, OSP missions will be conducted and timed to avoid any possible impact or collision with the International Space Station and other manned missions, as part of normal operations. Accordingly, no significant impacts to the orbital debris population are expected.

For OSP mission debris that survives atmospheric re-entry, expected casualty risks on the ground for all upper stage motors, and for all or most OSP orbital mission payloads (spacecraft), will be within DOD guidelines (expected casualty risk levels no greater than 1 in 10,000). Because of this, and the fact that no casualties from re-entry debris have been reported over the last 40 years, no significant impacts from re-entry debris are expected to occur.

**Environmental Monitoring and Management Actions:** Within the EA, various management controls and engineering systems for all locations affected are described. Required by Federal, state, DOD, and Agency-specific environmental and safety regulations, these measures are implemented through normal operating procedures.

Though no significant or other major impacts are expected to result from implementation of the Proposed Action, some specific environmental monitoring and management activities have been identified to

## DRAFT

minimize the level of impacts that might occur at some locations or in some environmental settings. They include avoidance of launches (whenever possible) to prevent noise impacts on pinnipeds during the pupping season, light management plans to minimize impacts on nesting sea turtles and hatchlings, and spacecraft design considerations to minimize orbital and re-entry debris. These and other measures to be implemented are summarized in Section 4.4 of the EA.

**Public Review and Comment:** An availability notice for public review was published in local newspapers for each program support location on or before November 3, 2005, initiating a 30-day review period that ends on December 2, 2005. Copies of the Draft EA and Draft FONSI were made available in local libraries in Alaska, California, Florida, Maryland, and Virginia. The EA and FONSI also appeared on the Space and Missile Systems Center (SMC), Los Angeles AFB web site at <http://ax.losangeles.af.mil/axf>, listed under “announcements.”

**Point of Contact:** The point of contact for questions, issues, and information relevant to the EA for the OSP is Mr. Thomas Huynh, SMC/AXFV, Los Angeles AFB, California. Mr. Huynh can be reached by calling (310) 363-1541, by facsimile at (310) 363-1503, or by e-mail at [Thomas.Huynh@losangeles.af.mil](mailto:Thomas.Huynh@losangeles.af.mil).

**Conclusion:** Based upon review of the facts and analyses contained in the EA, the SMC Environmental Protection Committee, chaired by Brigadier General William N. McCasland, has concluded that implementation of the Proposed Action will not have a significant environmental impact on the human and natural environment, either by itself or cumulatively with other projects. Accordingly, the requirements of NEPA, the CEQ Regulations, and 32 CFR Part 989 are fulfilled and an Environmental Impact Statement is not required.

### Approved:

---

WILLIAM N. MCCASLAND  
Brigadier General, USAF  
Vice Commander

---

Date